



Update on PHG4KalmanPatRec

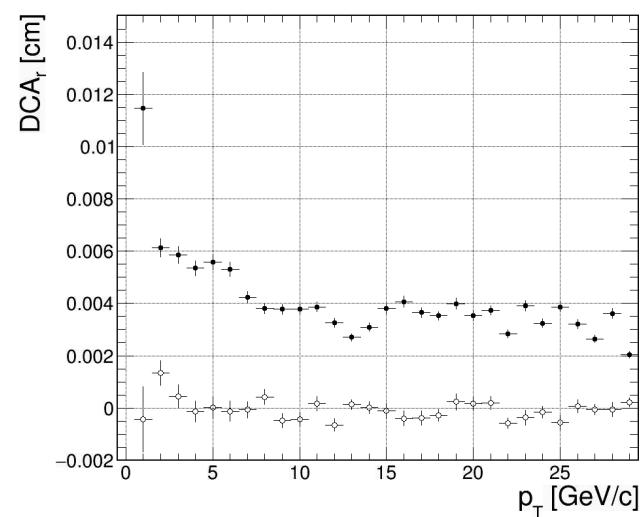
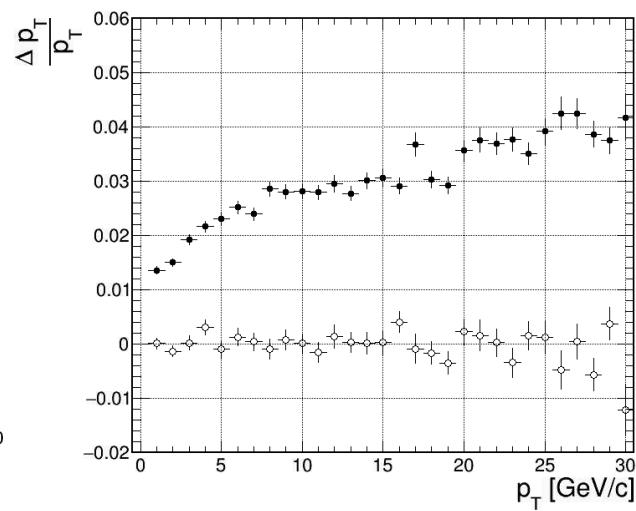
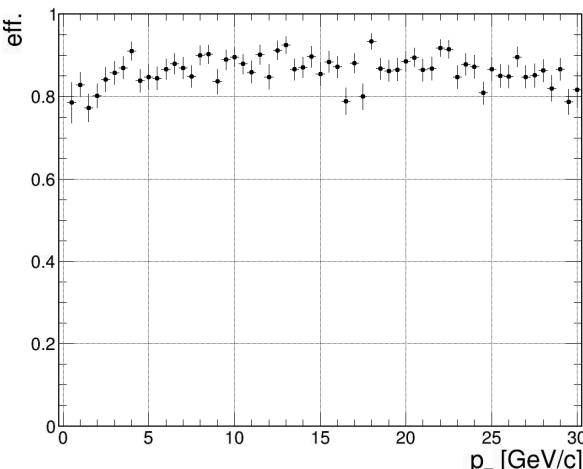
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Central Hijing test - 2017-05-23

- Assuming initial vertexing resolution 100 micron
- Seeding: 5/7 TPC {7, 15, 25, 35, 45, 55, 66}
- Outside-in propagation
- Search win: 5σ
- $\chi^2 < 20$

```
===== Timers: =====
Seeding time:           19.0723 sec
  - Seeds Cleanup:    0.0169507 sec
Pattern recognition time: 50.0373 sec
  - Track Translation time: 32.5845 sec
  - Cluster searching time: 0.11208 sec
  - Encoding time:        0.00652307 sec
  - Map iteration:        0.08886 sec
  - Kalman updater time:   7.92678 sec
```

Full fitting: ~ 2min



Change log

- Pulled in Christof's seed cleanup development
- Silicons have a high fake rate using Alan's Hough to do the inner-outer link
 - So switched to use TPC alone seeding
- Search hits: switch $\{r\phi, z\}$ to $\{\phi, \theta\}$ for the silicon ladders do not reside on the same r
 - the spreading of r for MVTX ladders is around 0.1cm
- A bug fixed in the Kalman updater
 - Averaged state now properly passed to next fitting
- Some exception handling in: PHGenFit, PHG4TrackKalmanFiter
 - Now can successfully finished 100/100 central Hijing embedding events
- Using some smeared initial vertex: currently using $100\mu\text{m}$
- Put best parameters in the module default initialization
 - parameters are tuned with laddered silicon + cylindrical TPC

Using this module

Related libraries:

coresoftware/offline/packages/HelixHough
coresoftware/offline/packages/PHGenFitPkg/GenFitExp
coresoftware/offline/packages/PHGenFitPkg/PHGenFit
coresoftware/simulation/g4simulation/g4hough

Simple version:

https://github.com/HaiwangYu/macros/blob/KalmanPatRec/macros/g4simulations/G4_Svtx_maps_ladders%2Bint_ladders%2Btpc_KalmanPatRec.C#L429

More options:

<https://github.com/HaiwangYu/macros/blob/KalmanPatRec/macros/g4simulations/RunKalmanPatRec.C>

```
//-----
// Load libraries
//-----

gSystem->Load("libfun4all.so");
gSystem->Load("libg4hough.so");

//-----
// Fun4All server
//-----

Fun4AllServer *se = Fun4AllServer::instance();

const bool use_kalman_pat_rec = true;
if (use_kalman_pat_rec) {
    //-----
    // PHG4KalmanPatRec
    //-----
    PHG4KalmanPatRec* kalman_pat_rec = new PHG4KalmanPatRec(
        "PHG4KalmanPatRec");
    se->registerSubsystem(kalman_pat_rec);

} else {
    //-----
    // Truth Pattern Recognition
    //-----
    PHG4TruthPatRec* pat_rec = new PHG4TruthPatRec();
    se->registerSubsystem(pat_rec);
}

//-----
// Kalman Filter
//-----
PHG4TrackKalmanFitter* kalman = new PHG4TrackKalmanFitter();
se->registerSubsystem(kalman);
```

Next

- More testing
 - Compare with TruthPatRec
- Real vertexing using RAVE?
- Search hit on relevant plane instead of fixed 'r'
- Tree search seeding?
 - Improving eff.

Backups

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